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ABSTRACT

A study using the static-group research design was performed comparing the raw standardized Stanford 9 high stakes test scores of career and technical education (CTE) students with those of other students while controlling for extraneous variables such as learning styles, special populations, gender, race, and ethnicity. Two thousand high school students in three Arizona school districts (urban, suburban, and rural) were in the study. The Stanford 9 test instruments used were developed for the Arizona Department of Education and are given to all Arizona students. The "Learning Styles" assessment was given to the students participating in the study. Test scores on the Stanford 9 were analyzed using the Statistical Package for the Social Sciences (SPSS 10.0) using frequencies, means, standard deviations, correlations, and regression. Students receiving Individualized Vocational Education Plans had higher Stanford 9 tests than those eligible but not receiving them. Students with CTE concentrations were not significantly associated with higher or lower test scores. The researchers concluded that CTE students will always do worse on raw score comparisons, but when extraneous variables are controlled for, there is no difference between CTE and other students. Consequently, they concluded, raw score comparisons are inappropriate because the groups are different. (Contains 14 references and an extensive glossary) (SLR)

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A Comparison between Career and Technical Education and Other Students on a High Stakes Test

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A Comparison between Career and Technical Education and Other Students on a High Stakes Test

Abstract

The question should actually be, "Is a raw score comparison a fair and accurate measure between the two groups?" The answer is "No, Career and Technical Education (CTE) students scored lower than other students on a recent high stakes test in Arizona." Yet, when other influences were controlled for the following factors were found to have a significant influence on the score: All five "Special Population" areas (handicapped, limited English proficiency, economically disadvantaged, academically disadvantaged and being a single parent) were significantly associated with lower test scores and were predominantly found in the CTE population. Higher Visual Learner (learn by seeing) and Auditory Learner (learn by hearing) scores were significantly associated with higher test scores and were predominantly found with other students. Higher Kinesthetic Learner scores were significantly associated with lower test scores and were predominantly found with CTE students. Black, Hispanic or other males were associated with lower test scores. Hispanic females were associated with lower test scores.

Therefore, after controlling for the other influences (extraneous variables), no difference was found between the two groups. That means that they are just different groups of people and a raw score comparison is not an appropriate comparison.

Does grouping students according to their special population status affect the comparison? Yes, because there was a higher proportion of CTE students who received special population services and because special population categories were associated with lower test scores.

The conclusions are simple: Career and technical education students, for the most part, will always do worse on raw score comparisons. When the appropriate extraneous variables are built into the equation and controlled for, there usually is no difference between CTE and other students on standardized test scores. The raw score comparisons are inappropriate because the groups are different. The differences in scores can be attributed to the effects of the extraneous variables and not because of curriculum choice.

The implications for educators are important. If extraneous effects are not understood and controlled for, than career and technical education will not have a very positive future.

Therefore the recommendations are: CTE Administrators and Teachers must understand the problems associated with raw score comparisons on standardized tests. CTE state leaders must utilize this type of information in CTE promotional campaigns.

Introduction

"High stakes, test-based reform is an approach that is most often driven by state-level mandate, and it suits the political appetite for rapid, quantifiable results (Thompson, 2001). In 1983, *A Nation at Risk* was introduced as a reform effort for the public school system. It was soon

followed by yet another effort of reform in 1987 with *America 2000*. However, this was not the end of the reform assault on education. The Clinton Administration introduced *Goals 2000*, which marks the third major or national attempt at reform for the nation's education system within the last two decades.

Assessment has become a part of life, whether it is in the classroom or in the job field. We as a society have evolved our system of life around successes and failures. The task of assessment is used everyday by numerous people. The teacher uses assessment to determine what the students have learned or what they have not learned (Brown, 1996). The parent uses assessment in the fashion of examination of chores to determine if their children are to receive their allowance. The employer uses assessment to gauge the progress of an employee. The employer may also use assessment to determine promotions of employees (Race, 1995).

It may be a task that we have become accustomed to, but is it something that we are comfortable with? Is it necessary? Who shall determine the assessment and who will achieve at a higher rate? These are questions that are often thought about, but are left for pondering.

The state of Arizona uses standardized tests to determine the progress of students at the secondary level. Standardized tests vary in their ability to assess the student in a fair manner. These types of tests are used to assess higher order reasoning skills and academic growth over time (Sanders & Horn, 1995).

Comparison is the main issue with standardized testing. It gives some way of determining the learning ability or retention of the student. These tests are often considered the most visible indicator of education successes and failures. Therefore, it is critical that the assessment and curriculum be aligned so as to give the greatest benefit to fairness (Nielson, 1985).

Problem Statement

The issue at hand is what type of student achieves at a higher level? Do students with strong academic course work achieve at a higher level than those students that have a career and technical education (CTE) background? It seems that there is a concern with the progress of career and technical education students and how they perform on state mandated achievement tests versus students that are considered non-career and technical education. There are many other influences that affect student scores such as: ethnicity, SES, gender, parent's education, IVEP, learning styles, etc. The purpose of this research project was to compare career and technical education students and non-career and technical education students on the Stanford9 high stakes test.

Objectives

The objective of the study was to compare the Stanford9 test scores between career and technical education and non-career and technical education students while controlling for extraneous variables, learning styles, special populations, gender, race, and ethnicity.

Definition of Terms

To facilitate better understanding of this study, several terms commonly referred to in education will be defined.

AIMS: The acronym for Arizona's Instrument to Measure Standards. This high stakes test was designed to determine who would be eligible for a high school graduation diploma.

Career and Technical Education: also known as vocational education. Organized educational activities that offer a sequence of courses that provide individuals with the academic and technical knowledge and skills the individuals need to prepare for further education and for careers in a current or emerging employment sectors (other than careers requiring a baccalaureate, master's, or doctoral degree). The program includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupational-specific skills.

Career and Technical Educational Programs: a coherent sequence of instruction designed to deliver the entire set of state-designated program competencies. A program is directly related to the preparation of individuals for employment in an occupation (e.g.,: mechanics, welding, production agriculture). Approved and provisionally approved programs qualify for state and federal funding.

Carnegie Unit: One unit of credit awarded in grades 9-12 for a minimum of 150 clock hours of instruction during the regular school year, or 120 clock hours of instruction during summer school.

Competency: an educational "construct/concept" or abstraction derived from the workplace task, knowledge, skill, or attitude requirements.

Competency Attainment: successful, demonstrated, and documented achievement of a competency.

Continuous Improvement: The process of systematically planning and measuring program progress and results toward achieving desired improvements.

Course Sampler: A high school graduate who has completed a Level III career and technical education course but has not completed a career and technical education program per the district's planned sequence of courses. The course must be part of an approved career and technical education program.

Individualized Vocational Education Plan (IVEP): required for each career and technical education student who is a member of a special populations category and who needs special services in order to succeed in his/her career and technical education program. The IVEP is a written plan that specifies the eligible category in which services are provided and lists the student's goals, strengths and weaknesses, and the services required to reach these goals. Examples of services, modifications or accommodations include: smaller classes, modification to classroom or equipment, alternative assessment instruments, additional time for completion or tutoring services.

Local Education Agency (LEA): means a board of education or other legally constituted local school authority having administrative control and direction of public elementary or secondary schools in a city, county, township, school district, or political subdivision in a State, or any other public educational institution or agency having administrative control and direction of a

career and technical education program.

Non-standardized assessment: is the traditional form of assessment within the classroom.

Placement: a measure of the number of career and technical education students who graduated and were placed in postsecondary education or advanced training, employment and/or military service within nine months. This measurement is required for program completers and optional for course samplers.

Program CIP (Classification of Instructional Programs) Code: the code used by Arizona to classify career and technical education programs. The code is derived from the U. S. Department of Education's standard educational program classification system and includes a uniform numbering system and description of educational programs.

Program Concentrator: A student who completes two Carnegie units of a single VTE program. One Carnegie unit must be at level III.

Program Completer: A student who has attained at least 80% of the state designated competencies for an approved VTE program (levels I, II, III).

Special Populations: Eligible categories of students who may receive services in order to succeed in career and technical education courses and programs. Services provided must be documented on the student's IVEP. Eligible categories include:

Handicap/ Disabled: means an individual with any disability (as defined in section 3 of the Americans with Disabilities Act of 1990. (42 U.S.C. 12102)).

LEP: a student with Limited English Proficiency: a secondary school student, an adult, or an out-of-school youth, who has limited ability in speaking, writing, or understanding the English language, and-

A) Whom native language is a language other than English; or

B) Who lives in a family or community environment in which a language other than English is the dominant language.

Academically Disadvantaged: a student at or below the 25th percentile on a standardized achievement or aptitude test whose secondary school grades are below 2 on a 4 scale, where 4.0 equals an A; and/or a student fails to attain minimal academic and career and technical education competencies.

Economically Disadvantaged: a family or individual including foster children, which the Local Education Agency identifies as low income (on the basis of uniform methods described in the State plan) and who requires financial assistance to succeed in career and technical education. Examples of eligibility definitions include: Annual income at or below the official poverty line; Eligibility for Aid to Families with Dependent Children or other public assistance programs; and Eligibility for participation in programs assisted under Title I of the WIA.

Nontraditional: a student enrolled in a career and technical education program that has been identified as a nontraditional program for his or her gender.

Single Parent: Individual who has custody and responsibility for the support and the care of one or more dependent children under the age if eighteen in the same residence. The individual only providing child support, but does not provide custodial care, is not considered a single parent for eligibility purposes. Single pregnant women are included.

Standardized assessment: is the form of assessment that is the same for all individuals in a

certain category (i.e., grade).

Stanford9: The Ninth Edition of the *Stanford Achievement Test* used to fulfill the requirements of the Arizona Revised Statutes Section 5-741 through 744. It is a norm-referenced achievement test in the subjects of reading, language and mathematics.

State-Designated Program Competencies: The career and technical education curriculum competencies identified as Levels I, II, and III for each career and technical education program available through the School To Work Division at the Arizona Department of Education.

Unduplicated Enrollment: means that a student is counted only once even though he/she may meet more than one criterion.

Conceptual/Theoretical Framework

Multiple measures of assessment are typically used to yield valid results (Liu, 1997). At the intermediate level the standardized test is used to compare students with their peers from similar learning settings (Cooper, 1995). Agricultural Education is at a state in which there is question as to the purpose for an agricultural education program and it is aligned with career and technical education (CTE). Secondary CTE continues to suffer from a negative image among students, parents, educators, and policymakers (Wonacott, 2001). It is plagued by the negative stereotype that vocational education is only for non-college bound, the potential dropouts, and other students with various special needs.

Administrators and Boards are in a position to determine the local status of an agricultural education program and the purpose of instruction in such course (Jewell, 1989). Career and technical education students and educators are constantly facing the challenge of new technologies, complex information, and skills. These changes place an overwhelming demand, that the students posses the ability to process vast amounts of information and knowledge in practical and systematic ways (Cano, 1993). The agricultural education programs, in Arizona, assist the students in developing and improving their problem-solving skills, which in turn aids in the process of critical thinking (Cano, 1993). These students may actually be at an enhanced level when talking about assessment. They are often skilled at taking various different forms of assessment as compared to the non-vocational student who may be exposed to one or two different forms.

Regardless of the educational pathway, as a society, the custom is subscribe to the theory of "rite of passage" (Sacks, 00). We learn, early in life, that the way to advance to the next grade or level is to pass the standardized test that is typically administered toward the end of the school year. Much like we have labeled students as "vocational" and "non-vocational," test scores have been used as a lever for labeling a competent child as "overachievers" because his/her academic performance exceeded what the tests predicted. On the other hand, recall the hand wringing over the "underachiever," the student whose brilliant test scores predicted greater things than what he/she actually accomplished (Sacks, 2000). These are often stigmas that stay with an individual (Sacks, 2000). Is this the way to teach? Should their test scores label students?

Standardized test are known to vary in their ability to assess the students knowledge fairly (Sanders & Horn, 1995). Vocational students may posses the hands-on skills for practical and systemic needs. Non-vocational students may also posses those same skills but are never instructed on the benefits and uses of those skills. Who is at the advantage and who is at the disadvantage? With the shift toward higher-order thinking one would think that the CTE student would be at the advantage over the non-vocational. Research indicates that students who study vocational agriculture in high school perform academically just as well as students who did not study vocational agriculture. It is further researched that the ratios of vocational agriculture students who complete college is greater than that of students who did not have vocational agriculture in high school (Raven, 1990).

Standardized tests are used to determine the students ability to learn. They are often referred to as aptitude tests. Aptitude is defined to be a natural or acquired ability to understand new information and skills. It has been argued that these aptitude tests really measure the rate at which an individual is able to learn. The new theory for education of the twenty-first century is to concentrate on what is learned rather than what is taught (Brown, 1996). So should we use a standardized test to criticize and label or should we use them to praise what has been learned? These high stakes tests are often the most visible indicator of success and failure for the student as well as the parent (Nielson, 1985). Although they were developed from state standards that were agreed upon a committee, they fail to take into considerations that not every school and student is identical to the next.

The state of Arizona has working curriculum standards (competencies) for the numerous CTE programs. These competencies enable the teacher/instructor to identify attainment of specific skills that are required by the students. This is a form of testing without the pressure of the high-stakes testing procedures. This type of instruction leads to instructionally relevant assessment versus irrelevant policy-driven evaluation.

Tests have come to define our priorities. Schools are focusing on "core-subjects" and are forced to eliminate CTE and fine arts programs. These programs may not be directly correlated to the standards being assessed by the state mandated tests, but they do serve a purpose (see Figure 1).

Students learn more efficiently when they are actively engage in a project or task. Career and Technical Education allows for various learning styles and exploration. A growing body of evidence indicates that learning styles are important to both understanding and managing the teaching-learning process (Cox & Zamudio, 1993). The fine arts discipline engage students in their own learning, allowing them to ask questions and explore. The most significant intellectual achievement is not so much in problem solving, but in question posing (Eisner, 2001). Students must be guided in their education not manipulated. The act of posing questions will in turn expand the ideas and understandings of the student.

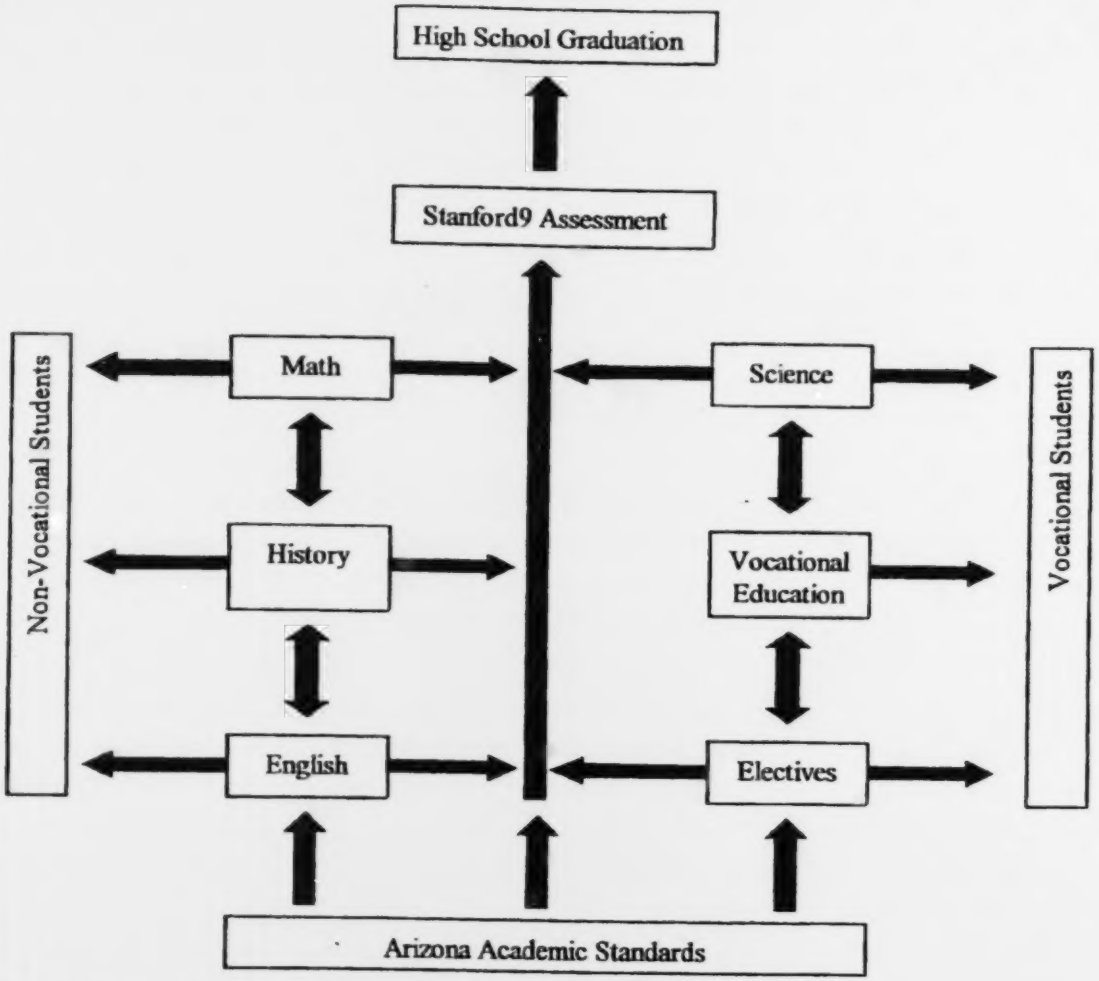

Figure 1 Conceptual Framework for the Stanford9 Assessment.

There is too much labor in our schools and not enough work (Eisner, 2001). Work is defined as an effort for which you derive satisfaction (Eisner, 2001). Students should be motivated in school to the verge that they feel they are successfully accomplishing the task at hand.

Our schools across the nation are becoming mass "test-prep" facilities. Schools under intense pressure to show better test results have allowed those tests to cannibalize the curriculum (Kohn, 2001). Curriculum becomes narrowed as school district policies make it clear that what is to be tested is what is to be taught (Eisner, 2001).

Methods/Procedures

The static-group comparison, as described by Campbell and Stanley (1963), was used for this study. The static-group comparison design uses two groups of subjects (students). In this study the two groups compared are the CTE students and the non-CTE students. "This is a design in which a group which has experienced X is compared with one which has not, for the purpose of establishing the effect of X," stated Campbell and Stanley (1963). The diagram of the static-group comparison is as follows:

$$\begin{array}{l} X ___ O_1 \\ \qquad\quad O_2 \end{array}$$

Internal Validity

The threats of history and testing were controlled because the students received only one test. They did not take part in a pretest/posttest study. The threats from selection, mortality, and maturation were present because each individual student was not randomly selected and there was no pretest to determine if the dependent variable was affected by the independent variable.

External Validity

The experimental population of this study was high school students participating in the Stanford9 test from three different geographical regions in the state of Arizona. The target population was all high school students engaged in completing the Stanford9 test for graduation requirements.

Variables

The dependent variable for this study was the scores received by the students on their Stanford9 test. The independent variable of interest for this study was:

1. 2000 graduates from an urban, suburban, and rural district in the state of Arizona.

The independent variables with possible influence (extraneous) on the dependent variable were:

1. Gender: male/female
2. Race / Ethnicity: White (not of Hispanic origin), Black (not of Hispanic origin), American Indian or Alaskan Native, Asian or Pacific Islander, Hispanic, Other / Multiracial.
3. Special Populations (eligible and category): Handicapped, Limited English Proficiency, Economically Disadvantaged, Academically Disadvantaged, Single Parent.

4. Learning Styles: Visual Learners (Learn most comfortable by seeing), Auditory Learners (Learn most comfortable by hearing), Kinesthetic Learners (Learn most comfortable by doing).
5. Subject Selection: The schools that will be participating in the study were chosen for their background. Several of the schools are form the rural areas of the state, while others represent the urban areas of Arizona.
6. Population and Sampling Procedure: Seven schools were chosen form across the state of Arizona. The idea was to try to represent the state student population in a fair and economic manner.

Instrumentation

The Stanford9 instruments used in this study were developed for the Arizona Department of Education. The second instrument used in this study was the "Learning Styles" assessment that was administered to all three districts participating in the study. Every student involved in the study was asked to complete the learning styles assessment that was then calculated to arrive at the various learning styles of the targeted students.

Data Collection Procedures

The three school districts selected for this study were asked to release their student test scores with complete confidentiality. The test scores were then obtained through the Arizona Department of Education.

Data Analysis

The survey instruments were analyzed using the Statistical Package for the Social Sciences (SPSS 10.0). The data was analyzed using frequencies, means, and standard deviations. Statistical tests used included correlations and regression.

Results

White students were the most prevalent group (see Table 1). Gender was divided almost equal between female and male (see Table 2). Students receiving IVEP services scored significantly higher on the Stanford9 test than those students who were eligible for services, but did not receive them (see Table 3). Table 4 indicates which variables were significantly associated with higher or lower test scores. The important variable of interest, if a student is a CTE concentrator, was not significantly associated with either higher or lower test scores.

Table 1
Race

	Frequency	Percent
White	1547	63.4
Black	65	2.7
Hispanic	336	13.8
American Indian or Alaskan Native	38	1.6
Asian or Pacific Islander	63	2.6
Other Multiracial	167	6.8
Missing	224	9.2
Total	2440	100.0

Table 2
Gender

	Frequency	Percent
male	1215	49.8
female	1223	50.1
Missing	2	.1
Total	2440	100.0

Table 3
Comparing Ivep Groups on the Stanford9 Test Scores

SERVICES	Number	Average Stanford9 test score*	Standard Deviation	Standard Error Mean
services received	60	98.1500	54.8034	7.0751
eligible but not received	27	64.2963	40.2032	7.7371

* statistically significant at the 0.05 alpha level

Table 4

Regression Analysis with Stanford9 Test Scores as the Dependent Variable

Variables	Unstandardized Coefficients		Standardized Coefficients	t-value	Significance
	B	Std. Error	Beta		
(Constant or intercept)	53.522	14.248		3.757	
Learning Styles Auditory Score	1.298	.218	.107	5.951	.000*
Learning Styles Visual Score	5.396	.279	.364	19.361	.000*
Learning Styles Kinesthetic Score	-3.568	.250	-.268	-14.262	.000*
Are they a Concentrator	1.095	2.721	.008	.403	.687
White female	.148	4.543	.001	.033	.974
White male	-6.998	4.591	-.045	-1.524	.128
Black female	-24.501	14.056	-.032	-1.743	.081
Black male	-30.436	10.434	-.056	-2.917	.004*
Hispanic female	-22.636	6.571	-.075	-3.445	.001*
Hispanic male	-38.185	6.061	-.143	-6.301	.000*
American Indian or Alaskan Native female	-20.766	15.412	-.025	-1.347	.178
American Indian or Alaskan Native male	-27.220	14.697	-.034	-1.852	.064
Asian or Pacific Islander female	.722	11.695	.001	.062	.951
Other female	-6.982	8.061	-.017	-.866	.386
Other male	-24.452	7.891	-.063	-3.099	.002*

Note: Asian or Pacific Islander Males were included in the intercept (constant) and were not significant.

* statistically significant at the 0.05 alpha level

Summary

All five "Special Population" areas (handicapped, limited English proficiency, economically disadvantaged, academically disadvantaged and being a single parent) were significantly associated with lower test scores and were predominantly found in the CTE population. Higher Visual Learner (learn by seeing) and Auditory Learner (learn by hearing) scores were significantly associated with higher test scores and were predominantly found with other students. Higher Kinesthetic Learner scores were significantly associated with lower test scores and were predominantly found with CTE students. Black, Hispanic or other males were associated with lower test scores. Hispanic females were associated with lower test scores.

Grouping students according to their special population status affects the comparison because there was a higher proportion of CTE students who received special population services and because special population categories were associated with lower test scores.

Implications/Recommendations

Therefore, after controlling for the other influences (extraneous variables), no difference was found between the two groups. That means that they are just different groups of people and a raw score comparison is not an appropriate comparison.

The conclusions are simple: Career and technical education students, for the most part, will always do worse on raw score comparisons. When the appropriate extraneous variables are built into the equation and controlled for, there usually is no difference between CTE and other

students on standardized test scores. The raw score comparisons are inappropriate because the groups are different. The differences in scores can be attributed to the effects of the extraneous variables and not because of curriculum choice.

The implications for educators are important. If extraneous effects are not understood and controlled for, than career and technical education will not have a very positive future.

Therefore the recommendations are: CTE Administrators and Teachers must understand the problems associated with raw score comparisons on standardized tests. CTE state leaders must utilize this type of information in CTE promotional campaigns.

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